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PATENT SPECIFICATION 929,056

DRAWINGS ATTACHED.

929,056

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COMPLETE SPECIFICATION.

Improvements in Horizontal Metal-Extrusion Presses.

We, SCHLOEMANN AKTIENGESELLSCHAFT, a German Body Corporate, of Steinstrasse 13, Dusseldorf, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a horizontal press for the extrusion of metal tubes, comprising a main extrusion piston guided in a main extrusion cylinder carried by a cylinder cross-beam, a press ram carried by a ram platen secured to the main extrusion piston, and a piercing mandrel, carried by a piercing cross-bar, driven by a piercing piston, slidable in a piercing cylinder, which is arranged inside the main extrusion cylinder.

The object of the invention is to extrude tubes having a very high degree of concentricity. For this purpose it is necessary that the piercing means should be radially adjustable relatively to the pressing means, so that defects in the pressing means may not be transmitted to the piercing means. Such defects include, amongst other things, inaccuracies in the machining or in the mounting of the main extrusion piston in its cylinder, or of the cylinder in relation to the cylinder cross-beam, as well as inaccuracies due to wear. Such defects or inaccuracies have a directly unfavourable effect upon the piercing device, and therefore upon the concentricity of the tubes produced.

In general it is usual to connect the platen of such a press rigidly with the main extrusion piston. The most varied presses are known, both in frame construction and in column construction, with a short-flanged platen, or with a long platen which rests upon adjustable guideways; but the construction is always such that the platen and the main extrusion piston are centered together and relatively to one another.

From this there accrue disadvantages, which, together with the machining and mounting inaccuracies occurring between the cylinder cross-beam and the main extrusion piston, as well as the wear thereof, lead to a sinking of the piston in the cylinder. Thus edge pressures arise. The rigid connection of the platen with the main extrusion piston occasions the transmission of any eccentric deviations of the piston to the platen, and with it, when there is a piercing appliance present, to the latter also, and ultimately they have an unfavourable influence upon the concentricity of the tubes. With an internally located piercing appliance, the piercing cylinder is supported in the main extrusion piston, and occasions, in the event of any eccentric supporting of the main extrusion piston, edge pressures, and the deviation of the piercing mandrel from the central. The tendency to exchange the main extrusion piston on account of these phenomena is indisputable; but the expense of doing so would increase the cost of the extruded products in an uneconomical manner.

According to the invention, therefore, the piercing cross-bar is radially adjustable in relation to the piercing piston or pistons.

In a preferred form of the invention the ram platen is radially adjustable in relation to the main extrusion piston.

The piercing cylinder has its seat in the ram platen, and projects, with clearance, into the main extrusion piston. The radial adjusting, both of the ram platen in relation to the main extrusion piston and of the piercing cross-bar in relation to the pierc-

[*Price* 4*s.* 6*d.*]

ing piston, is effected by putting in an intermediate member.

The mandrel rod of the piercing appliance is rotatably supported, as known in itself, in a slide, the slide being guided in the platen. According to a further feature of the invention, the slide is constructed as a yoke, and the limbs of the yoke carry appliances for limiting the stroke of the mandrel.

Further features of the invention will be gathered from the description of a constructional example illustrated in the accompanying drawing, in which:—

Figure 1 shows a longitudinal sectional elevation through the press;

Figure 2 a longitudinal sectional plan on the line II—II in Figure 1, on a larger scale; and

Figure 3 a cross section on the line III—III in Figure 1, on a scale larger than that of Figure 1.

In Figure 1, the essential parts of the press are marked as follows:—By 1, the nuts of the press columns 1*a*, by the bolster, with tool pressure plate 3, further pressure plates 4 and 5, a die 6, and a holding arm 7. The container is denoted by 8, and has displacing rods 9, the rear ends of which are mounted on a ring-traverse 9*a*. A billet to be pushed into the container 8 is marked 10. Shears 11 can be introduced from above. The press ram is marked 12, and a piercing mandrel guided therein is marked 13. The press ram 12 is secured to a platen 14, and the piercing mandrel 13, by way of the mandrel-holder 13*b*, to a piercing cross-bar 15. The piercing cross-bar 15 is longitudinally slidable upon a slideway 16, which is rigidly arranged in the platen. The platen 14 is guided on slideways 17. To crossbar-like limbs 18, projecting upwards and downwards from the platen 14, are attached the piston rods 19 of pistons sliding in retraction cylinders 19*a* for the withdrawal of the platen.

The main extrusion piston 20 is slidable in the extrusion cylinder 21, which, with its extrusion-cylinder cross-beam 22 carrying the retraction cylinders 19*a*, is supported in the usual manner. As a coupling there serves a multi-part ring flange 25, which is fixedly mounted concentrically on the platen, and an annular ledge 20*a* on the extrusion piston 20, which engages, with radial clearance, behind the ring flange. The coupling is thus relieved of radial forces, and the press ram 12 is radially adjustable relatively to the main extrusion piston 20. The piercing cylinder 23 is supported in the platen 14, and projects freely, with its rear end, into the open cavity of the main extrusion piston 20. In it is slidable a piercing piston 24, which has radial clearance with the piercing cross-bar 15, as shown in Figure 2. This radial clearance between the piercing piston and the piercing cross-bar permits radial adjustment of these two members.

Between the piercing cross-bar 15 and the piercing piston 24 is arranged an intermediate member 53 of soft metal or synthetic material, to compensate for any lack of parallelism of the contact surfaces of these members. A similar intermediate member 52 is arranged between the opposite end faces of the main extrusion piston 20 and the ram platen 14. In both cases the radial clearance (which is of course quite small) between these two pairs of members is in close proximity to these intermediate members.

The mandrel-holder 13*b* is attached to a mandrel-holder-carrier 13*c*, which can be rotated by means of a worm wheel 50, the mandrel-holder and the mandrel then rotating with it. This serves for the adjusting of the mandrel when producing non-circular hollow profiles.

Out from lateral window apertures 26 in the platen 14 project overhanging arms 27 of the piercing cross-bar 15. These arms carry cylinders 28, in which slide the retraction pistons 29 for the piercing cross-bar 15. The pistons 29 are attached to the front portion 14*a* of the platen 14. Moreover they carry means for restricting the stroke of the mandrel, that is, means which absolutely limit the forward travel of the piercing cross-bar 15, which is necessary when extrusion is to be effected with the mandrel stationary. The arms 27 of the piercing cross-bar 15 are for this purpose each provided with a liner 30, in which there is journalled, non-slidably but rotatably, a displacing sleeve 31, which carries a worm wheel 32. The displacing sleeve 31 is provided with an internal screw thread. It accommodates an externally screw-threaded abutment sleeve 33, which is in each case non-rotatably mounted upon one of the abutment rods 34, the rear ends of which are stationarily secured at 35 Each abutment sleeve 33 has two sliding bushes 36 and 37, in which it carries the abutment rod 34, which at its free front has two abutment nuts 38, against which the abutment sleeve 33 strikes when the piercing cross-bar 15 advances. The mandrel, during its forward travel, comes to a standstill earlier or later, according to the position of the abutment sleeve 33 in relation to the projecting arms 27 of the piercing cross-bar 15. The worm wheels 32 located on opposite sides of the piercing cross-bar may have a common drive, in a manner not illustrated, for instance by the worms that drive them being mounted upon a common shaft.

Furthermore an appliance is provided which limits the rearward travel of the

piercing cross-bar 15 in the platen 14. Owing to the arrangement thereof, according to the tools inserted and the extrusion problems to be solved, the rearward travel of the piercing cross-bar 15 relative to the platen can be limited, in order that no unnecessary distances may be traversed, which would obviously waste time and power. Bushes 39 are mounted for this purpose in the projecting arms 27 of the piercing cross-bar 15, and in these bushes, sleeves 40 are non-slidably but rotatably supported. The sleeves 40 can each be driven by way of a worm wheel 41, and they each have an internal screw thread, with which they can push out rearwards, that is, towards the right, a threaded rod 43, which is non-rotatably supported. The threaded rods 43 push with their right-hand ends against abutment plates 42, which are supported in the platen 14. By screwing outwards the threaded rods 43 to a greater or smaller extent, therefore, the rearward path of the piercing cross-bar 15 in relation to the platen 14 can be limited. The two worm wheels 41 can be driven by worms that are mounted on a common shaft, so that the movements of the threaded rods 43 will be effected in synchronism.

WHAT WE CLAIM IS:—

1. A horizontal press for the extrusion of metal tubes, comprising a main extrusion piston guided in a main extrusion cylinder carried by a cylinder cross-beam, a press ram carried by a ram platen secured to the main extrusion piston, and a piercing mandrel, carried by a piercing cross-bar, driven by a piercing piston, slidable in a piercing cylinder, which extends into the interior of the main extrusion cylinder, characterised by the feature that the piercing cross-bar is radially adjustable in relation to the piercing piston.

2. A press as claimed in Claim 1, characterised by the feature that the press ram is radially adjustable relatively to the main extrusion piston.

3. A press as claimed in Claim 2, characterised by the feature that the piercing cylinder has its seat in the platen, and projects, with clearance, into the main extrusion piston, which is hollow.

4. A press as claimed in Claim 2 or 3, characterised by the feature that the piercing mandrel and its mandrel-holder are rotatably supported in the piercing cross-bar, which is guided on a slideway in the platen.

5. A press as claimed in Claim 4, characterised by the feature that arms extending from the piercing cross-bar project out of lateral window apertures in the platen, and co-operate with stationary abutments for limiting the stroke of the mandrel.

6. A press as claimed in Claim 1 or 2, characterised by intermediate members of a soft metal or of synthetic material provided between the platen and the main extrusion piston, or between the piercing cross-bar and the piercing piston for the purpose of equalising contact surfaces that are not plane and parallel.

7. A press as claimed in Claim 1, characterised by the feature that the platen and the main extrusion piston are connected by a coupling centred in the platen, and relieved of radial forces.

8. A press as claimed in Claim 5, characterised by the feature that the projecting arms of the piercing cross-bar carry abutment bodies, such as abutment sleeves, which are slidable in the direction of extrusion, and which co-operate with the stationary abutments.

9. A press as claimed in Claim 8, characterised by the feature that the projecting arms of the piercing cross-bar carry abutment sleeves, which are adjustable in the direction of extrusion, and which accommodate in themselves stationary stroke-limiting rods, the rear ends of which are fastened to the cross-beam of the extrusion cylinder, while the front ends carry abutment nuts.

10. A press as claimed in Claim 9, characterised by the feature that the two abutment sleeves are each supported with an external screw thread in an internal screw thread of a displacing sleeve, which in its turn is rotatable and non-slidable in the projecting arm of the piercing cross-bar.

11. A press as claimed in Claim 10, characterised by the feature that the two displacing sleeves can be driven by a common drive, preferably by way of a worm drive with a common worm shaft.

12. A press as claimed in Claim 3, characterised by the feature that the piercing cross-bar is provided with axially adjustable abutments, such as screw-threaded rods, which, for the purpose of limiting the rearward movement of the piercing cross-bar in relation to the platen, co-operate with abutments on the platen.

13. A press as claimed in Claim 12, characterised by the feature that two screw-threaded rods are provided, one on each side of the mandrel axis, and are adjustable, preferably by means of jointly driven worm gears.

MARKS & CLERK.

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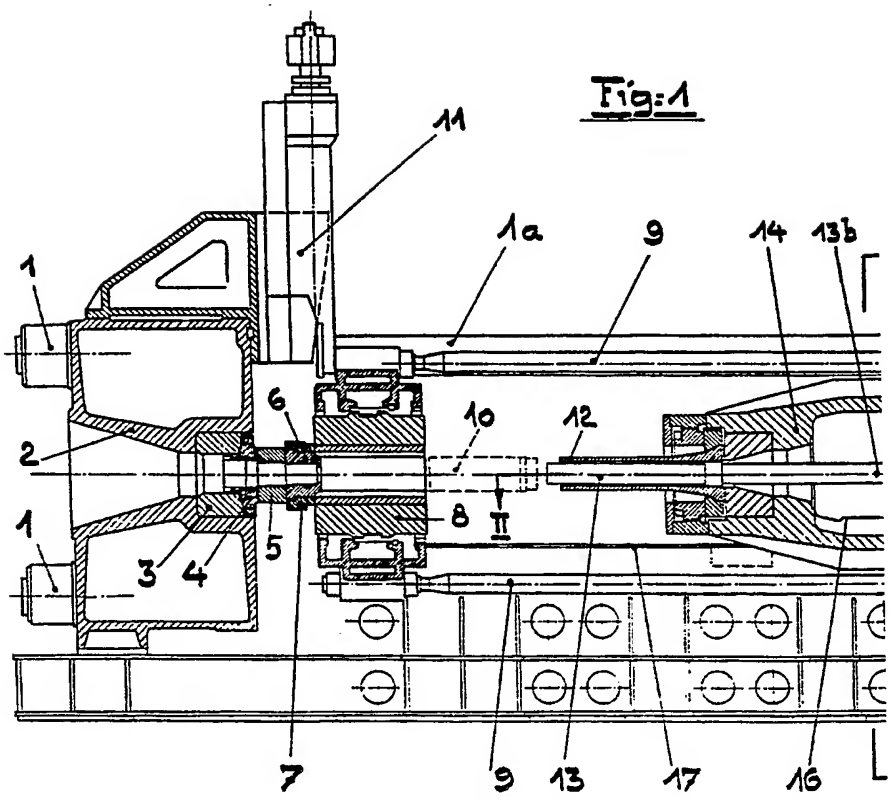
Fig:1



929056 COMPLETE SPECIFICATION
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Sheet 1

Fig:1

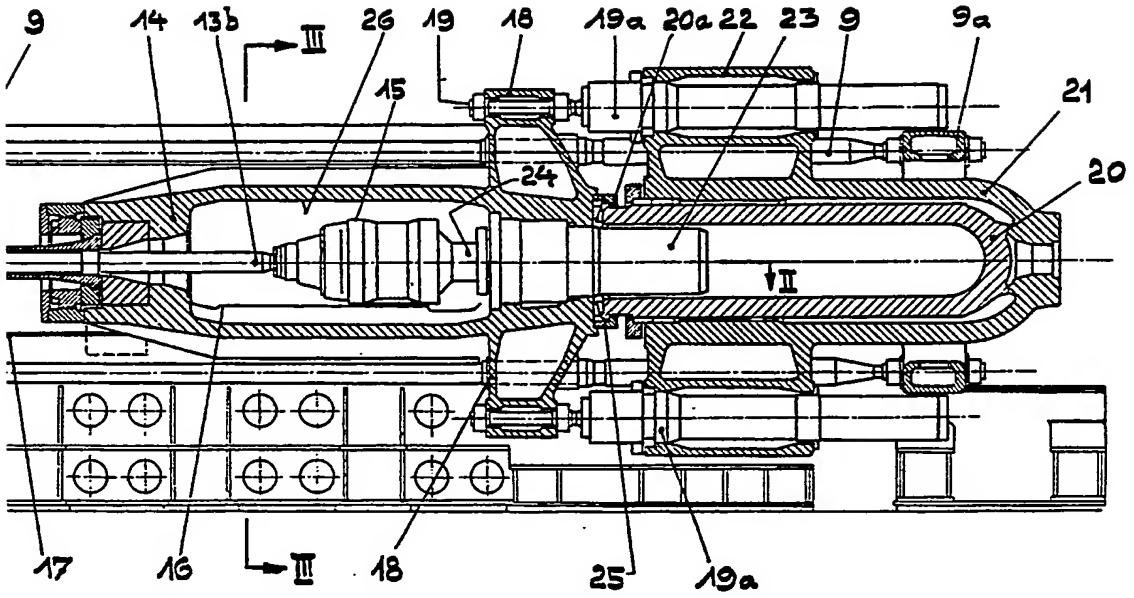

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Fig:1

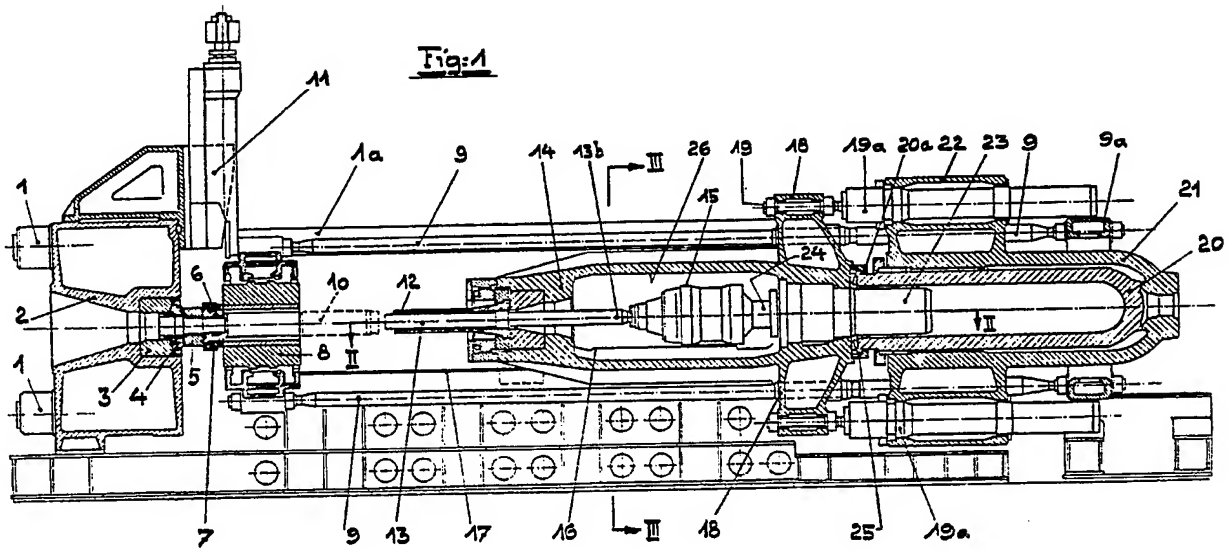
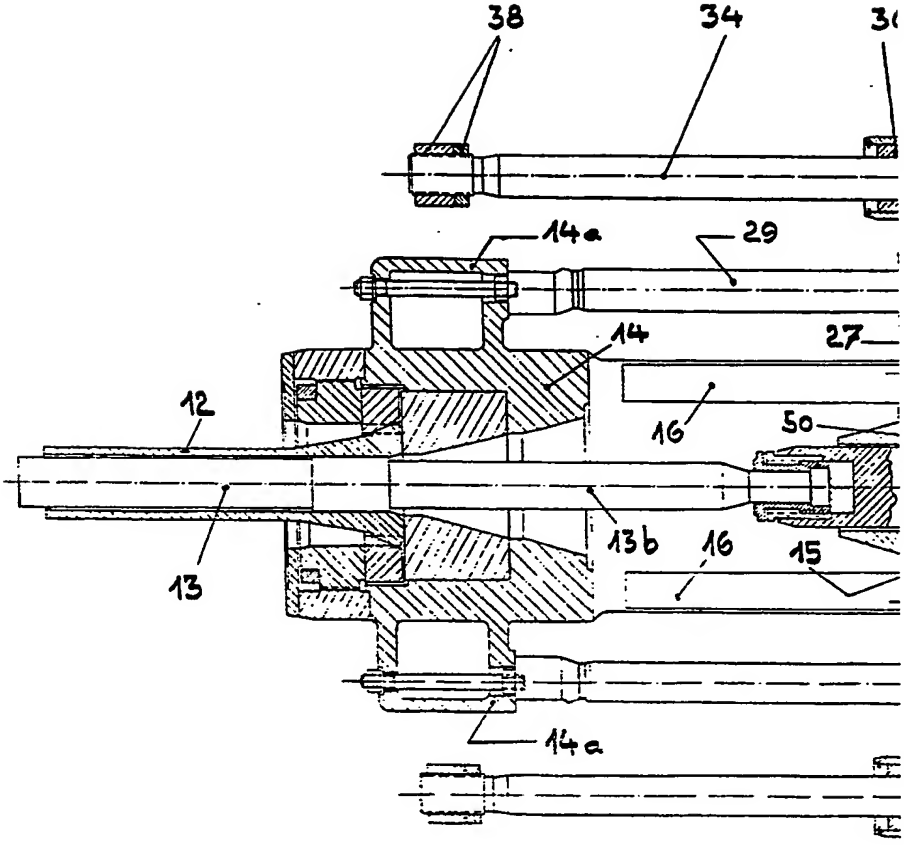


Fig:2



929,656 COMPLETE SPECIFICATION

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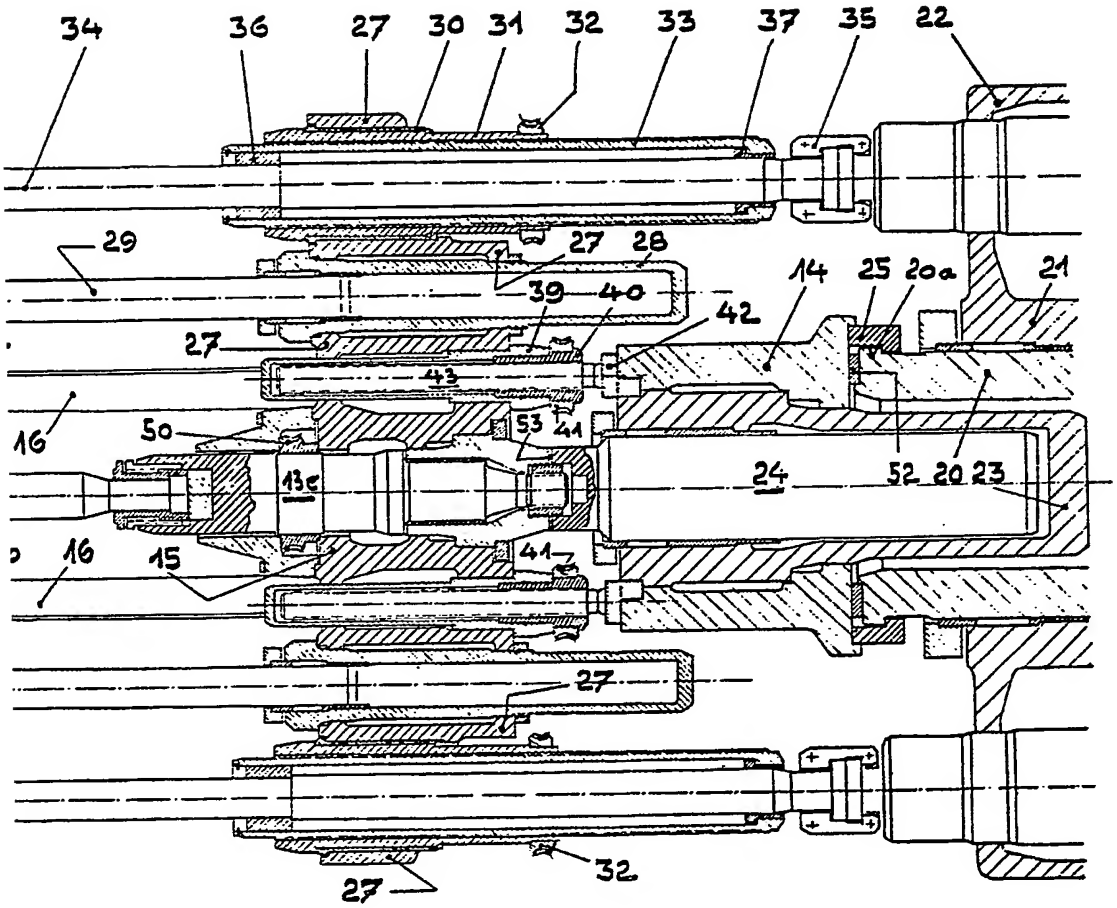

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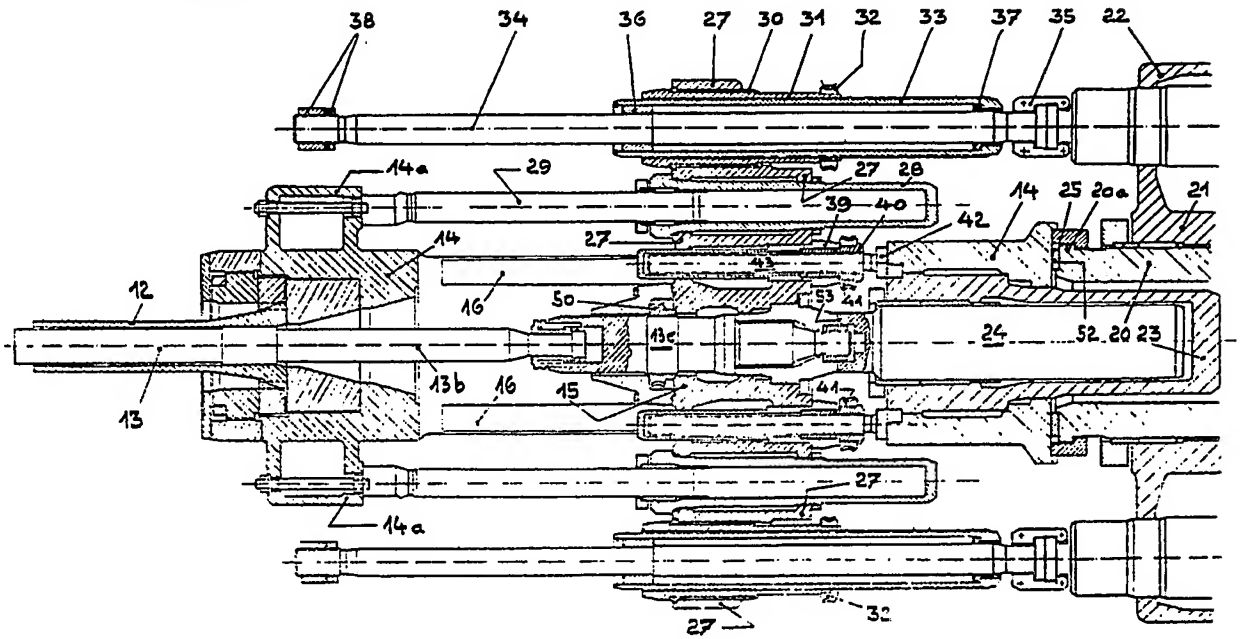
Sheet 2

Fig:2



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Sheet 3

Fig:3